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FIRE INCIDENCE 1961 - 1970

Research Note No. 14
May 1974

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RESEARCH NOTE NO. 14

May 1974

FIRE INCIDENCE

1961 - 1970

PRELIMINARY REPORT

Subject to Revision

Alberta
LANDS AND FORESTS
Forest Service

Prepared by:

R. S. Miyagawa
Fire Research Section
Forest Protection Branch
Alberta Forest Service
Edmonton, Alberta

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THE TOTAL FIRE INCIDENCE

- The Province of Alberta has had a total of 5,464 fires during the period 1961 to 1970. This is an average of 546 fires per year.

- Breakdown of fire incidence by Forest for the ten year period is shown in Table 1.

TABLE 1

FIRE INCIDENCE
1961-1970

Forest	Year 1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	Total
Athabasca	36	6	37	29	24	11	22	7	63	79	314 5.7%
Bow	24	18	20	20	6	16	48	34	20	50	256 4.7%
Crowsnest	17	18	10	8	13	6	52	7	13	18	162 3.0%
Edson	77	32	61	29	18	18	59	66	37	88	485 8.9%
Footner Lake	63	7	55	26	44	68	112	54	73	146	648 11.9%
Grande Prairie	74	26	41	14	7	15	48	22	21	66	334 6.1%
Lac La Biche	42	5	29	50	26	37	63	50	25	55	382 7.0%
Peace River	73	29	45	12	27	52	38	28	62	42	408 7.5%
Rocky-Clearwater	105	60	59	33	16	36	37	68	37	67	518 9.5%
Slave Lake	126	25	92	58	67	104	226	182	129	77	1,086 19.9%
Whitecourt	147	53	107	82	31	42	125	99	77	108	871 15.9%
TOTAL	784 14.3%	279 5.1%	556 10.2%	361 6.6%	279 5.1%	405 7.4%	830 15.2%	617 11.3%	557 10.2%	796 14.6%	5,464 100.0%

- Almost twenty per cent of the total fire incidence occurred in Slave Lake Forest.

- Three Forests (Footner Lake, Slave Lake and Whitecourt) combined, accounted for almost half of the total provincial fire incidence (47.7%).

- To relate fire incidence to the area protected within each Forest Table 2 shows a ratio of fire incidence per square mile under protection.

TABLE 2

FIRE INCIDENCE RATIO

Forest	Total Area Under Protection Sq. Miles	Average Annual Incidence of Fires per 1,000 Square Mile
Crowsnest	1,362	43.5
Whitecourt	7,824	11.1
Bow River	3,306	7.7
Rocky-Clearwater	6,837	7.6
Edson	10,157	4.8
Slave Lake	23,340	4.6
Lac La Biche	15,959	2.5
Grande Prairie	14,075	2.4
Footner Lake	31,976	2.0
Peace River	20,598	2.0
Athabasca	23,479	1.3
Provincial Total	158,916	3.4

- The Crowsnest Forest with the smallest area under protection had the heaviest fire load. Approximately 13 times as many fires occurred in a 1,000 square mile unit compared to the provincial totals (43.5 for Crowsnest compared to 3.4 provincial).

- Whitecourt Forest had the second highest fire incidence per 1,000 square miles (11.1).

- Bow River and Rocky-Clearwater Forests followed close behind in terms of fire incidence per 1,000 square miles (7.7 and 7.6 respectively).

- Athabasca had the lightest fire incidence with just over one fire per 1,000 square mile under protection.

ANNUAL FIRE INCIDENCE

- As shown in Table 1 the annual fire incidence for the province and for each Forest has been quite variable.

- Graphical representation however shows that the incidence has been rising during the last half of the decade (Appendix I, Figures 1 - 12).

- The breakdown of the incidence by lightning caused and man caused fires shows that the man caused fires played a major role in this upward trend.

- Table 3 shows a comparison of the five year averages which is indicative of the upward trend. The first five years appear to have an average fire hazard lower than the last five years, however increasing utilization of the forest, no doubt also had some effect.

TABLE 3

FIVE YEAR AVERAGE FOREST FIRE INCIDENCE COMPARISON

Forest	* All Causes - Five Year Averages 1961-1965	1966-1970	% Change	Man caused % Change	Lightning % Change
Footner Lake	39	86	+ 120	+ 139	+ 96
Slave Lake	74	145	+ 96	+ 167	+ 28
Bow River	18	34	+ 89	+ 77	+ 150
Crowsnest	13	20	+ 54	+ 78	- 33
Lac La Biche	31	46	+ 48	+ 36	+ 71
Athabasca	27	36	+ 33	+ 60	+ 35
Edson	46	54	+ 17	+ 53	- 33
Peace River	36	40	+ 11	+ 11	+ 44
Grande Prairie	32	34	+ 6	+ 43	- 25
Whitecourt	84	90	+ 7	+ 17	- 21
Rocky-Clearwater	55	48	- 27	+ 14	- 53
Provincial Total	455	633	+ 39	+ 61	+ 17

* Includes unknown caused fires

- Only Rocky-Clearwater Forest shows a negative change in the five year periods (-27%). The decline appears to be caused by a decreasing number of lightning fires.

- Footner Lake Forest shows the highest percentage overall increase in the five year averages (+120%). This may be partially due to the increasing detection coverage of this Forest.

- Slave Lake Forest shows the highest percentage increase in man caused fires (+167%).

- Bow Forest shows the highest percentage increase in lightning caused fires (+150%).

- All Forests show a definite increase in man caused fires.

Further details of causes will be dealt with in a later chapter.

MONTHLY AND WEEKLY FIRE INCIDENCE

- Table 4 shows the fire incidence on a monthly and weekly basis.

TABLE 4

MONTHLY AND WEEKLY FIRE INCIDENCE

Month	Week	Weekly	Monthly	% Weekly	Monthly
April	1	36		0.7	
	2	37		0.7	
	3	64		1.2	
	4	162		2.9	
	Missing	30		0.5	
			329		6.0
May	1	155		2.8	
	2	243		4.4	
	3	448		8.2	
	4	365		6.7	
	Missing	23		0.5	
			1,234		22.6
June	1	416		7.6	
	2	189		3.5	
	3	298		5.5	
	4	247		4.5	
	Missing	12		0.2	
			1,162		21.3
July	1	331		6.0	
	2	206		3.8	
	3	272		5.0	
	4	182		3.3	
	Missing	10		0.2	
			1,001		18.3
August	1	234		4.3	
	2	184		3.4	
	3	144		2.6	
	4	173		3.1	
	Missing	10		0.2	
			745		13.6
September	1	59		1.0	
	2	42		0.8	
	3	97		1.8	
	4	115		2.1	
	Missing	10		0.2	
			323		5.9
October	1	64		1.2	
	2	58		1.0	
	3	79		1.5	
	4	63		1.2	
	Missing	7		0.1	
			271		5.0
November - March			399		7.3
			5,464		100.0

- May, June and July average over 100 fires per month during the decade.

- The four month period from May to August inclusive had over 75% of the annual fire incidence.

- In 1968, 307 fires occurred in May which was the maximum incidence for any month during the ten year period.

- June had the second highest number of fire occurrence. In 1961 248 fires occurred during this month.

- The three week period from the third week in May to the first week in June inclusive had over 20% of the average annual fire incidence. During this period the fire incidence averaged 41 fires per week per year as compared to 18 fires per week per year for the period April to October inclusive.

- Graphic representations of the weekly changes in fire incidence are shown in Appendix I, Figures 13 - 24.

- All Forests combined, show man caused fire incidence peaking by the third week of May and falling rapidly by the middle of June and remaining at a fairly constant rate for the remainder of the fire season.

- Lightning fire incidence for the province as a whole, peaks in the first week of June and the first week of July.

- Lightning fire incidence begins falling off by the middle of August with incidence becoming very rare by the middle of September.

- Lightning fire incidence remains at a higher level than man caused fires during most of the season with the exception of the last two week in May.

- Table 5 shows the peak periods for each Forest in a tabular form.

TABLE 5

FOREST FIRE INCIDENCE PEAK PERIODS

Forests	All Causes	Lightning	Man caused
Athabasca	1st week June 1st week July	1st week June 1st week July	4th week June
Crowsnest	4th week July 4th week August	4th week July	4th week July 3rd week August 4th week August
Bow River	3rd week July 4th week August	3rd week July	2nd week July 4th week August
Edson	1st week June 1st week July	1st week June 1st week July	3rd week May
Footner Lake	4th week June 3rd week July 1st week August	1st week July 3rd week July 1st week August	4th week May 3rd week June

(continued) FOREST FIRE INCIDENCE PEAK PERIODS

Forests	All Causes	Lightning	Man caused
Grande Prairie	4th week May 1st week July	4th week May 1st week July	3rd week May
Lac La Biche	3rd week May 1st week June	1st week June	2nd, 3rd and 4th week May
Peace River	2nd week May 1st week August	3rd week July 1st week August	3rd and 4th week May
Rocky-Clearwater	3rd week May 1st week June	1st week June	3rd week May
Slave Lake	3rd week May	1st week June	3rd week May
Whitecourt	3rd week May 1st week June	1st week June 1st week July	3rd week May
All Forests	3rd week May 4th week May 1st week June	1st week June 1st week July	3rd week May 1st week July

DAILY FIRE INCIDENCE

- In order to analyze multiple fire situation day to day fire incidences were reviewed for the province.

- The daily probability rates based on ten years fire data are shown in Table 6. Only the months of May, June, July and August were used.

- There were three days in the ten year period which had more than 60 fires occurring in a single day. These days were May 20, 1968 (69 fires), June 4, 1961 (63 fires) and June 4, 1970 (67 fires).

- The highest ten year average number of fires in a single day occurs on June 4 (14.6 fires).

- The probability of ten or more fires occurring in a single day is the highest in the periods around May 18, May 21 and July 4.

- Fire incidence probability shows that:

  78% or 24 of the 31 days in May is expected to have at least 1 fire/day
  60% or 18 of the 31 days in May is expected to have at least 2 fires/day
  24% or 7 of the 31 days in May is expected to have at least 5 fires/day
  10% or 3 of the 31 days in May is expected to have at least 10 fires/day

  80% or 24 of the 30 days in June is expected to have at least 1 fire/day
  62% or 19 of the 30 days in June is expected to have at least 2 fires/day
  24% or 7 of the 30 days in June is expected to have at least 5 fires/day
  7% or 2 of the 30 days in June is expected to have at least 10 fires/day

72% or 22 of the 31 days in July is expected to have at least 1 fire/day
46% or 14 of the 31 days in July is expected to have at least 2 fires/day
21% or 7 of the 31 days in July is expected to have at least 5 fires/day
8% or 2 of the 31 days in July is expected to have at least 10 fires/day

66% or 20 of the 31 days in August is expected to have at least 1 fire/day
43% or 13 of the 31 days in August is expected to have at least 2 fires/day
16% or 5 of the 31 days in August is expected to have at least 5 fires/day
3% or 1 of the 31 days in August is expected to have at least 10 fires/day

TABLE 6

DAILY FIRE INCIDENCE PROBABILITY

MONTH OF MAY

Day	Probability (%) of 1 fire	2 fires	5 fires	10 fires	20 fires	30 fires+	Ten Year Average Daily
1	70	50	10	-	-	-	2.0
2	50	30	10	-	-	-	1.3
3	40	30	10	10	-	-	1.6
4	70	20	20	20	-	-	3.2
5	50	40	10	-	-	-	1.6
6	70	60	20	-	-	-	2.5
7	80	70	30	-	-	-	3.3
8	80	70	30	-	-	-	3.3
9	90	80	30	10	10	-	4.8
10	80	60	30	10	-	-	3.3
11	90	70	30	20	-	-	4.7
12	100	100	10	-	-	-	3.8
13	90	50	20	-	-	-	1.8
14	70	60	20	-	-	-	2.6
15	70	60	20	-	-	-	2.3
16	90	90	50	20	-	-	5.3
17	90	70	40	20	-	-	5.2
18	100	70	40	30	-	-	6.0
19	90	60	30	20	10	10	8.4
20	70	60	30	20	10	10	10.4
21	90	80	30	30	20	-	7.2
22	80	70	30	20	-	-	5.2
23	90	80	40	20	10	10	7.3
24	90	70	30	10	-	-	3.8
25	80	60	20	10	-	-	3.4
26	80	60	20	10	10	-	4.3
27	90	70	20	20	-	-	4.4
28	80	30	30	10	-	-	2.6
29	80	50	10	10	-	-	2.5
30	60	40	10	-	-	-	1.5
31	70	40	10	-	-	-	1.5
Average Probability	78%	60%	24%	10%	2%	1%	4 fires/day

TABLE 6

DAILY FIRE INCIDENCE PROBABILITY

MONTH OF JUNE

Day	Probability (%) of 1 fire	2 fires	5 fires	10 fires	20 fires	30 fires+	Ten Year Average Daily
1	70	60	20	-	-	-	2.4
2	80	50	20	-	-	-	2.2
3	80	70	20	10	-	-	3.1
4	80	70	20	20	20	20	14.6
5	80	70	50	20	10	-	6.1
6	90	80	60	20	20	10	8.5
7	100	80	40	20	-	-	4.7
8	80	50	30	10	-	-	3.7
9	90	80	20	10	-	-	3.8
10	100	50	20	-	-	-	2.8
11	70	40	30	-	-	-	2.4
12	70	60	-	-	-	-	1.7
13	60	40	20	-	-	-	1.6
14	70	50	20	10	-	-	2.9
15	100	100	40	-	-	-	4.4
16	90	70	30	10	10	-	4.8
17	90	60	20	10	-	-	4.0
18	100	90	20	-	-	-	2.9
19	90	70	30	10	-	-	4.8
20	80	70	30	10	10	-	3.6
21	90	70	20	10	-	-	5.3
22	90	70	20	-	-	-	2.5
23	60	40	10	-	-	-	1.4
24	70	60	30	10	-	-	3.3
25	80	70	40	20	10	10	7.9
26	70	50	20	10	-	-	2.7
27	80	70	20	-	-	-	2.5
28	80	30	20	-	-	-	1.9
29	50	40	-	-	-	-	1.1
30	70	40	-	-	-	-	1.4
Average Probability	80%	62%	24%	7%	3%	1%	3.8 fires/day

APPENDIX I

FIGURE 1

PROVINCIAL TOTAL FIRE INCIDENCE BY YEARS

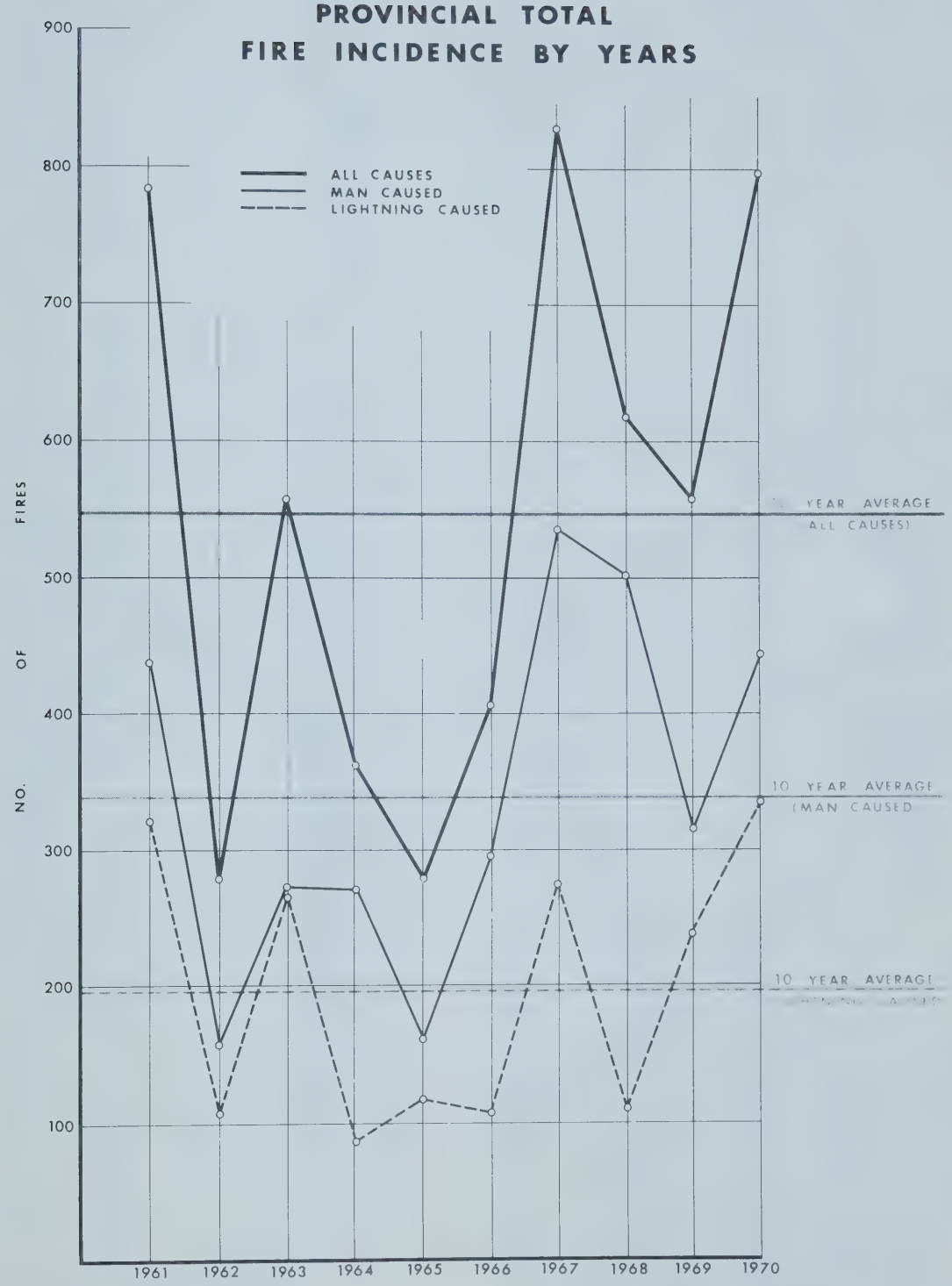


FIGURE 2

ATHABASCA FOREST
FIRE INCIDENCE BY YEARS

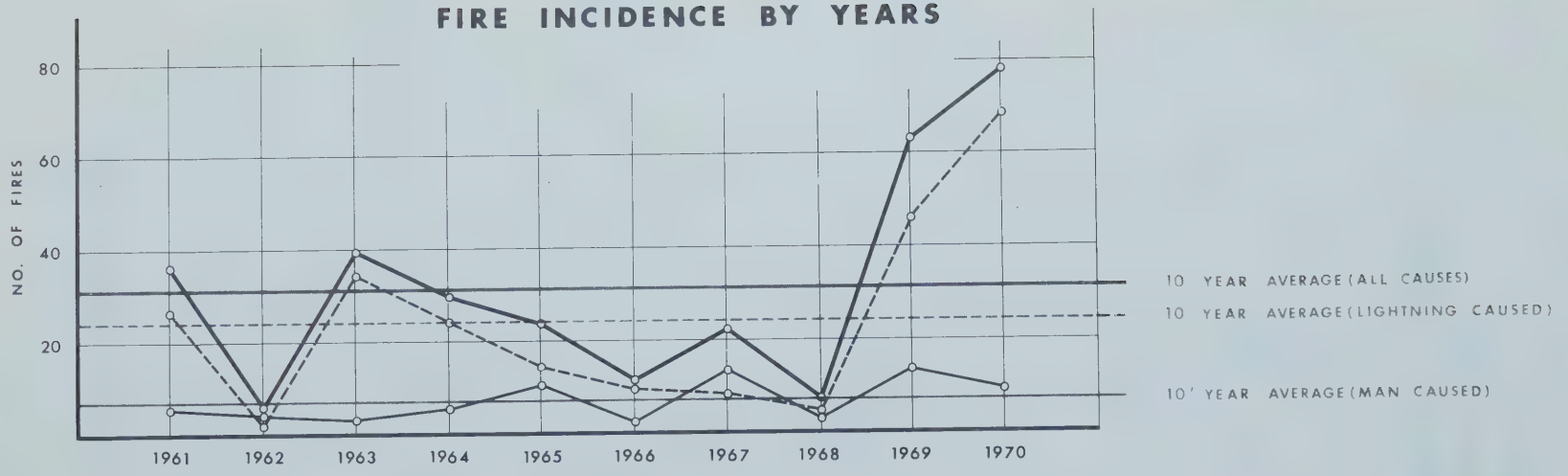


FIGURE 3

BOW RIVER FOREST
FIRE INCIDENCE BY YEARS

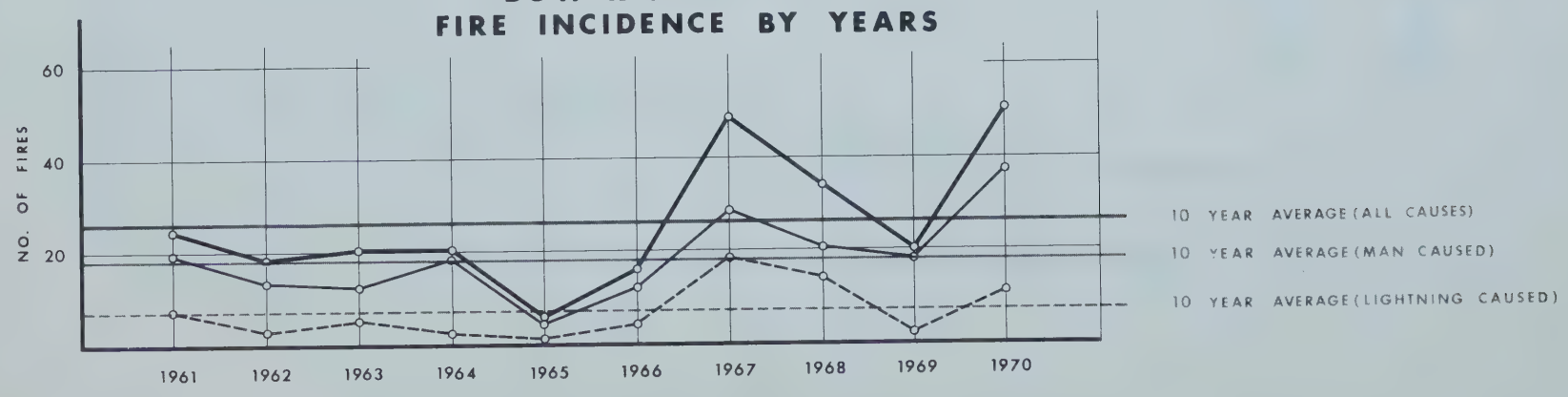


FIGURE 4

CROWSNEST FOREST
FIRE INCIDENCE BY YEARS

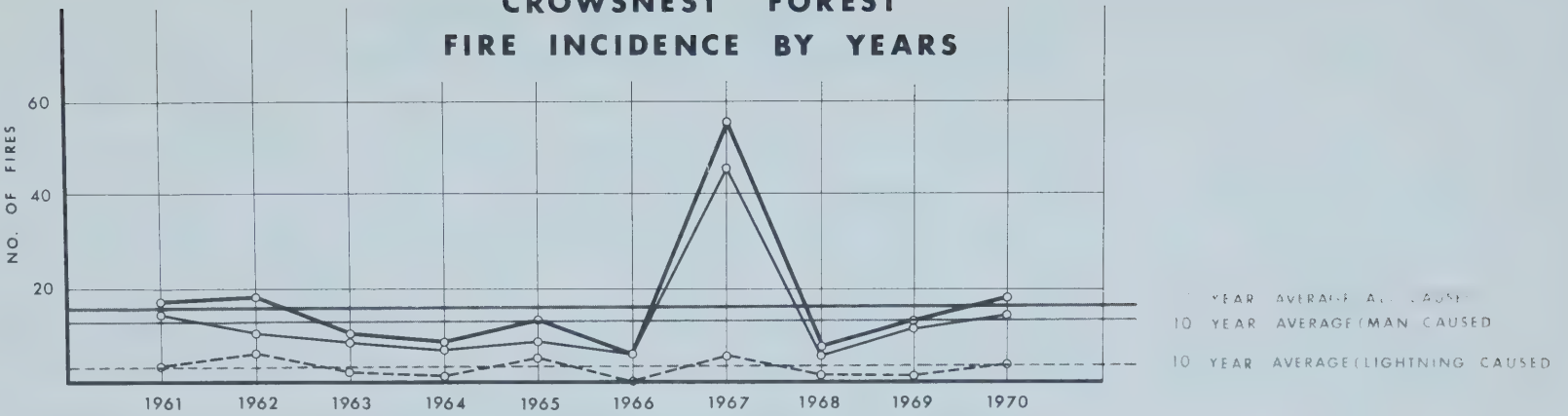


FIGURE 5

EDSON FOREST
FIRE INCIDENCE BY YEARS

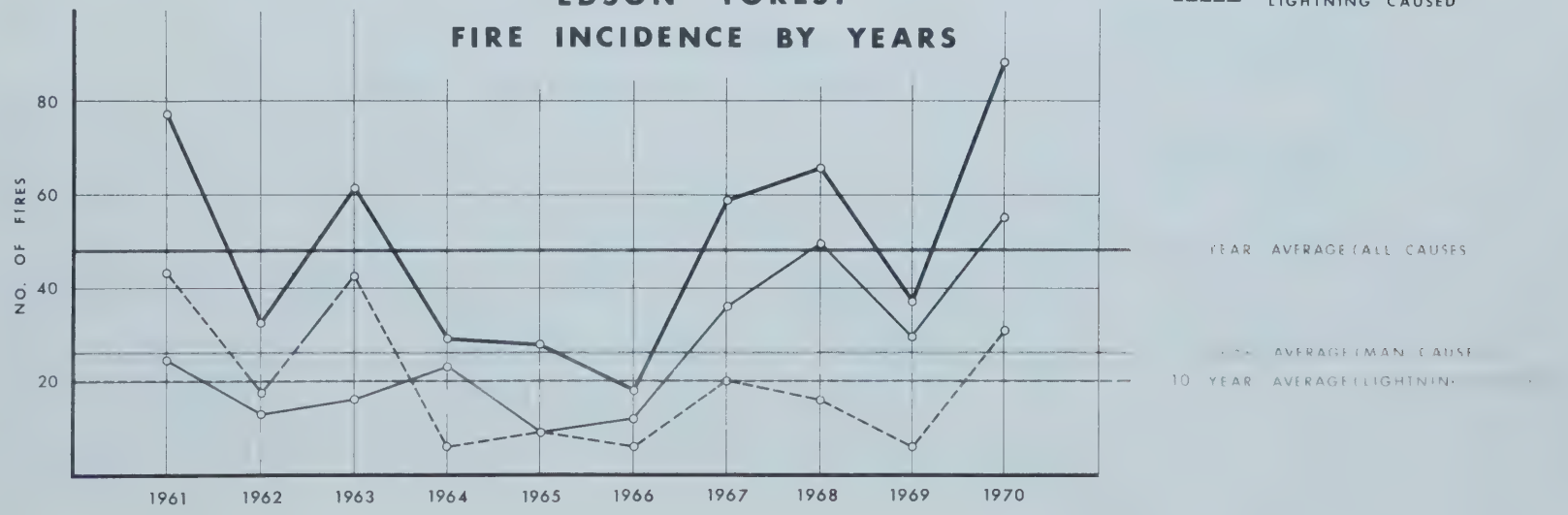


FIGURE 6

FOOTNER LAKE FOREST
FIRE INCIDENCE BY YEARS

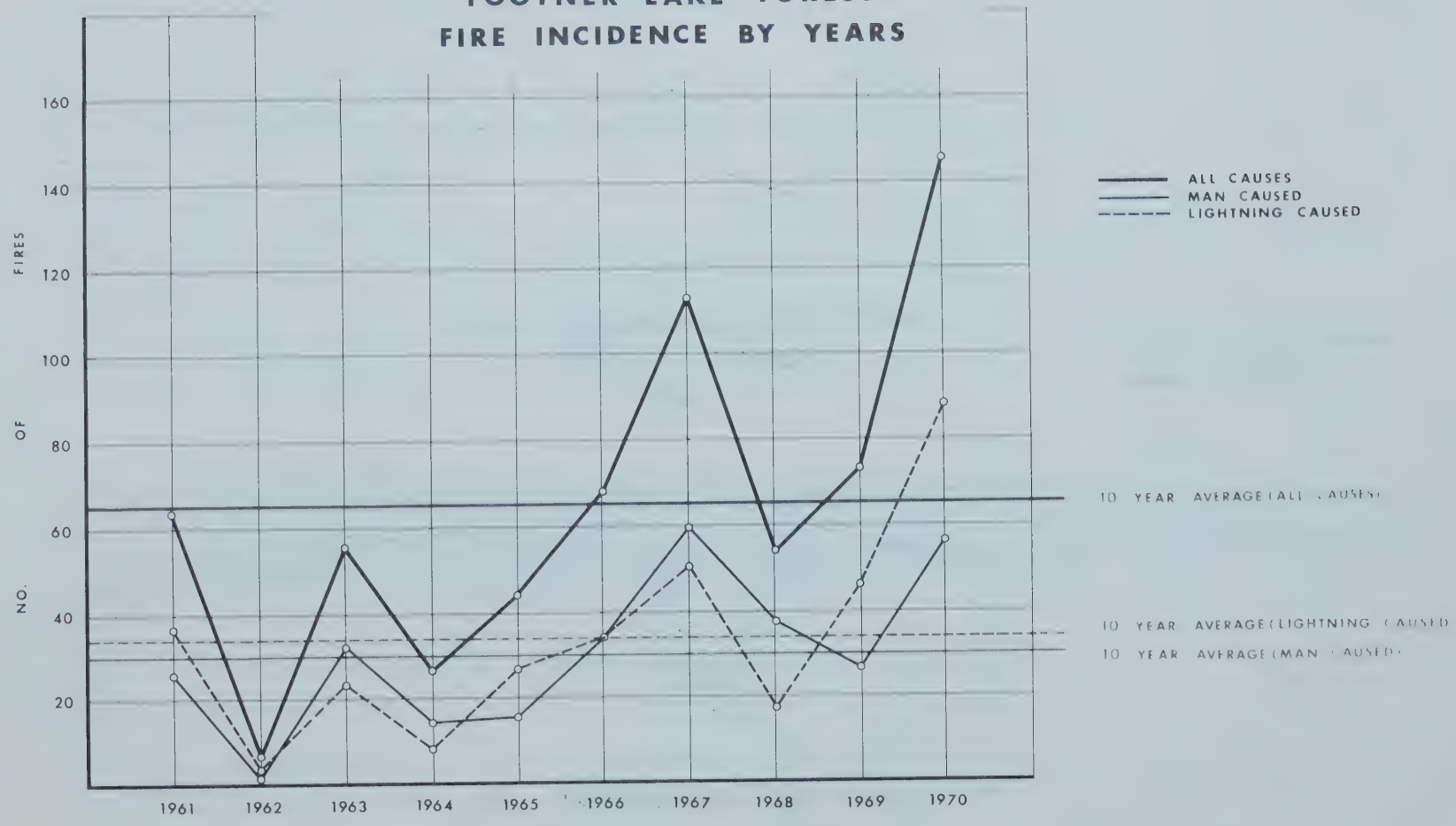


FIGURE 7

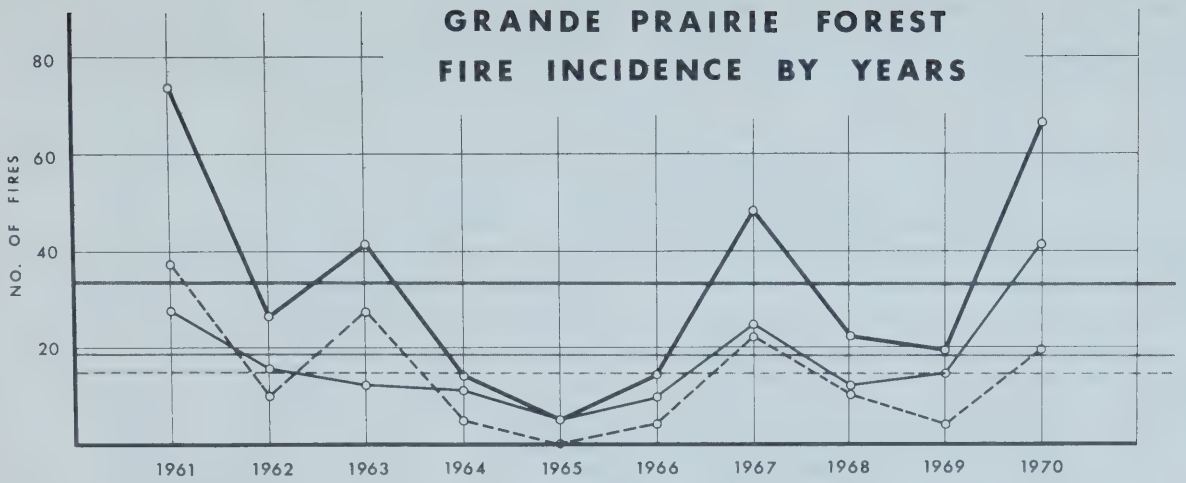


FIGURE 8

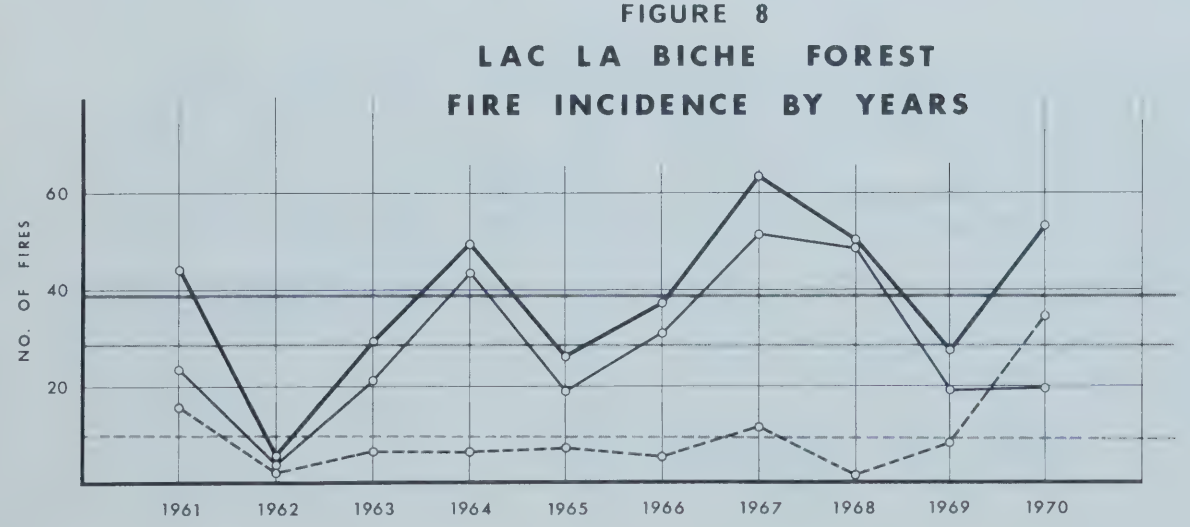


FIGURE 9
PEACE RIVER FOREST
FIRE INCIDENCE BY YEARS

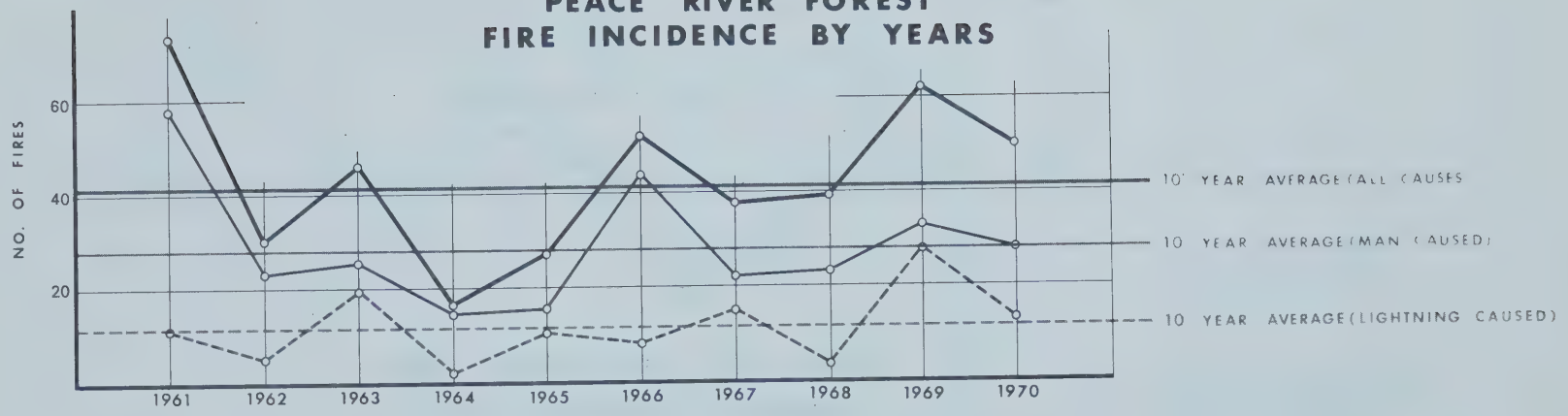


FIGURE 10
ROCKY-CLEARWATER FOREST
FIRE INCIDENCE BY YEARS

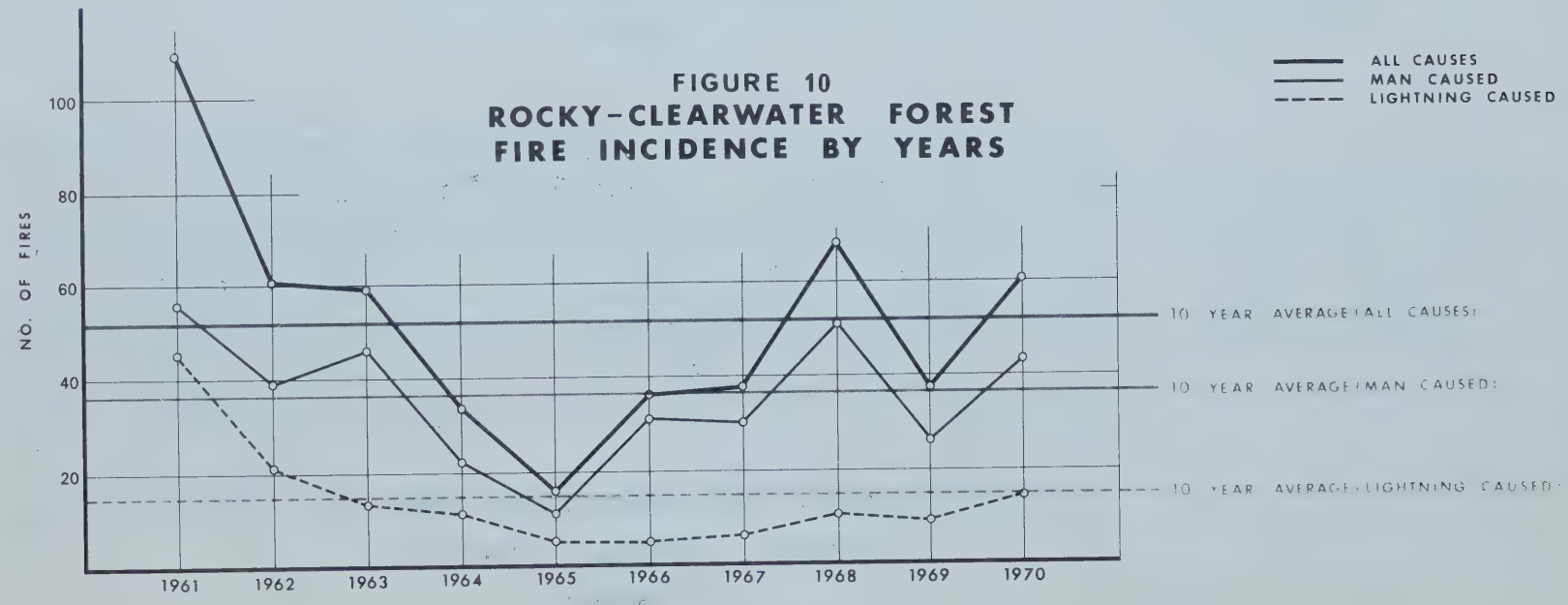


FIGURE 11
SLAVE LAKE FOREST
FIRE INCIDENCE BY YEARS

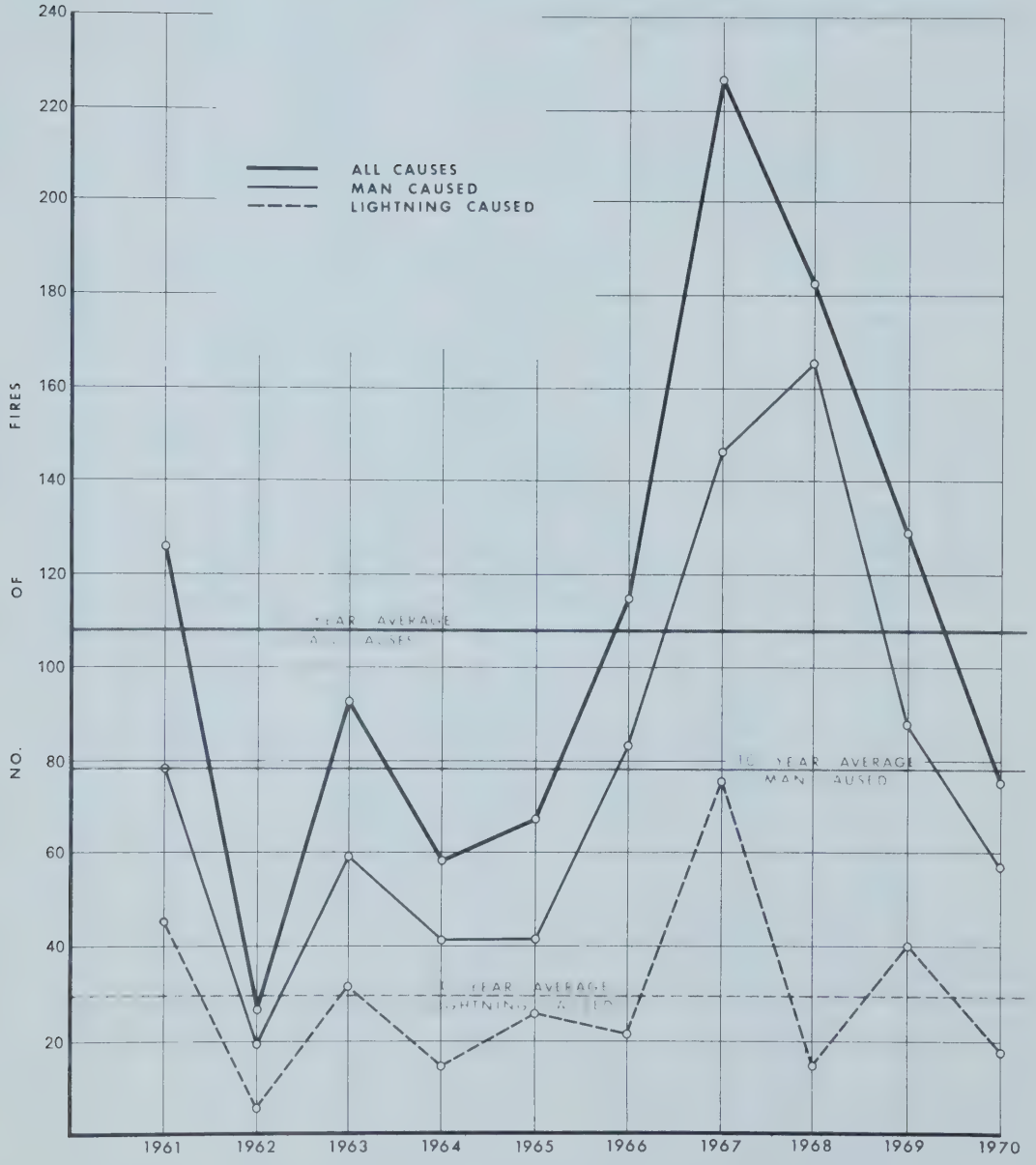


FIGURE 12

WHITECOURT FOREST
FIRE INCIDENCE BY YEARS

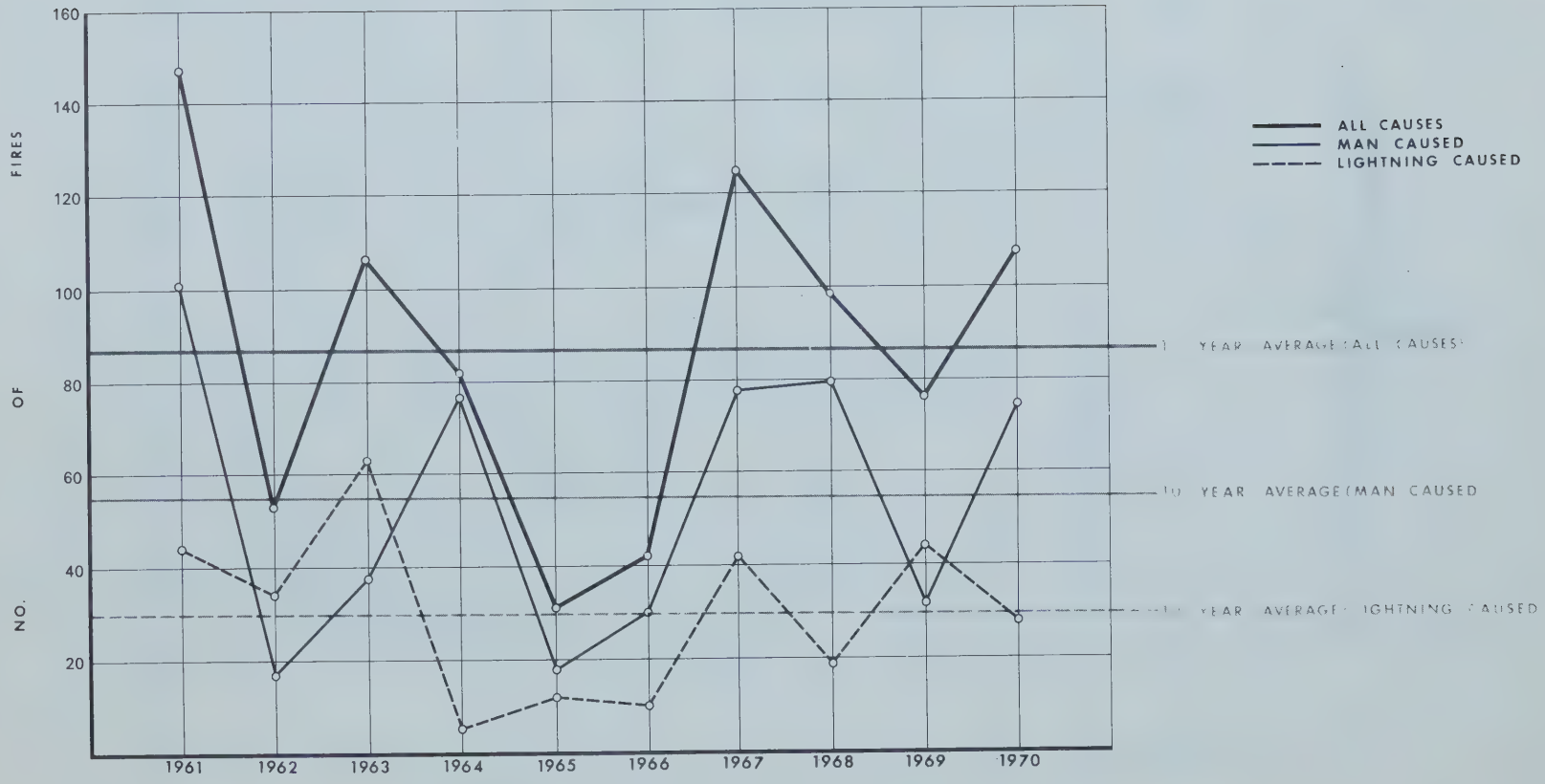


FIGURE 13

PROVINCIAL TOTAL
10 YEAR FIRE INCIDENCE
1961 – 1970 WEEKLY PERIODS

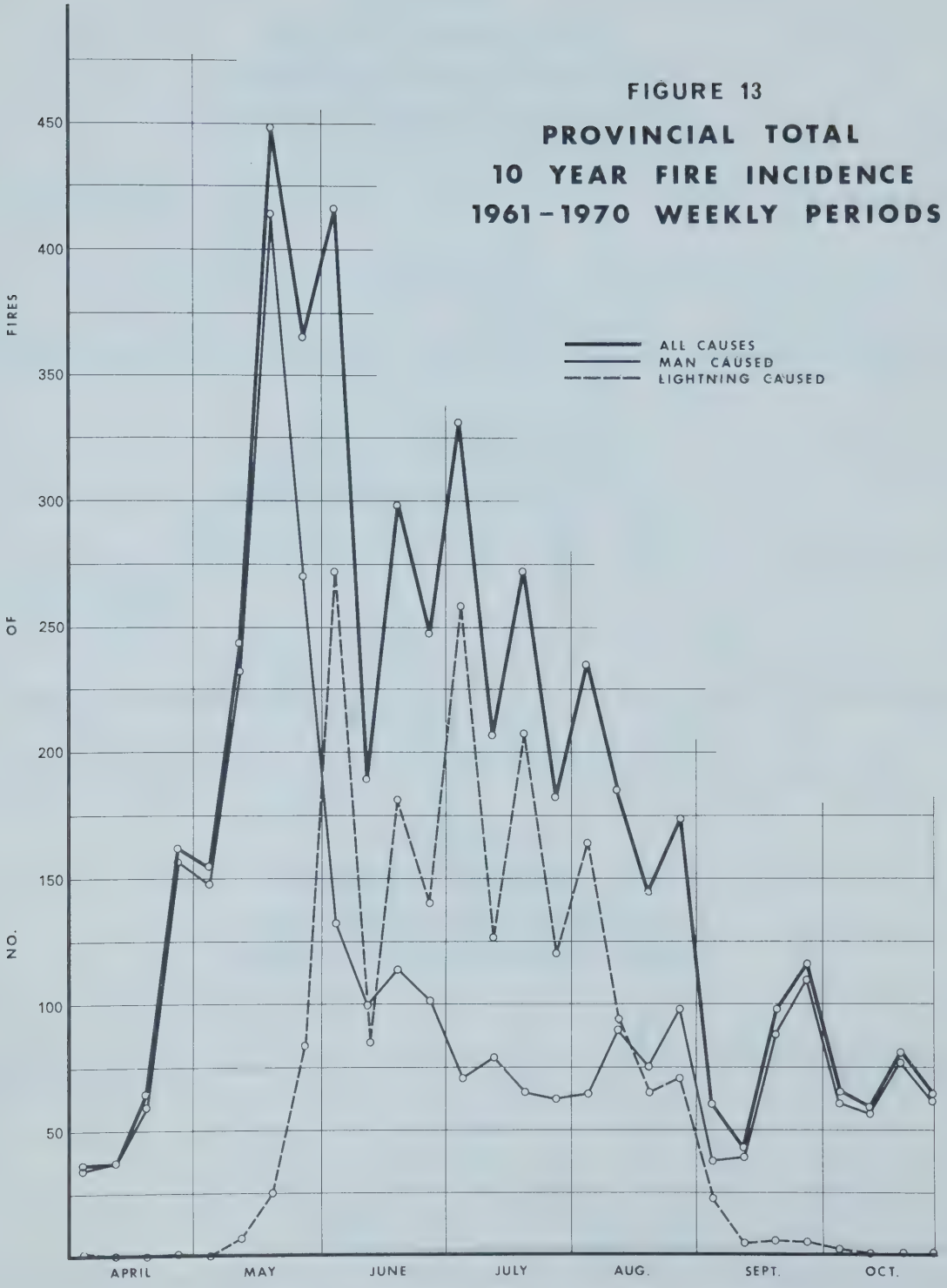


FIGURE 14

BOW RIVER FOREST

10 YEAR FIRE INCIDENCE

1961 - 1970 WEEKLY PERIODS

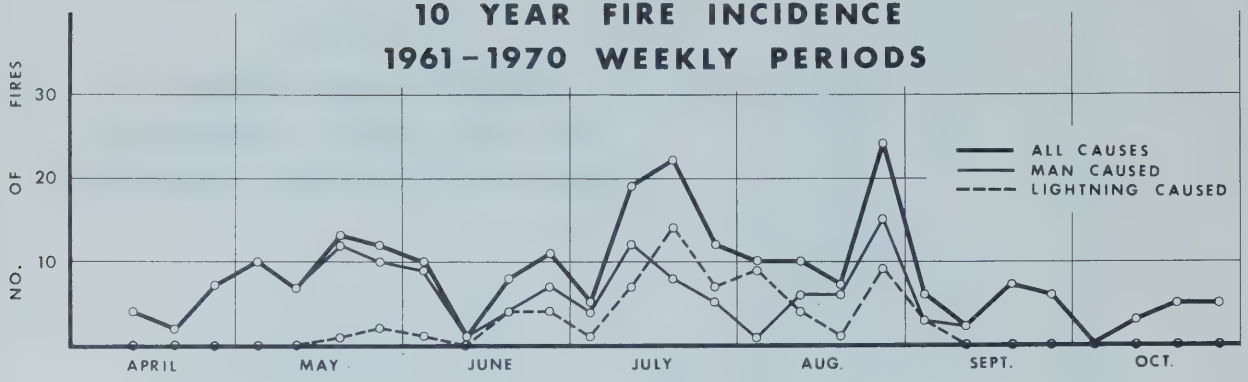


FIGURE 15

CROWSNEST FOREST

10 YEAR FIRE INCIDENCE

1961 - 1970 WEEKLY PERIODS

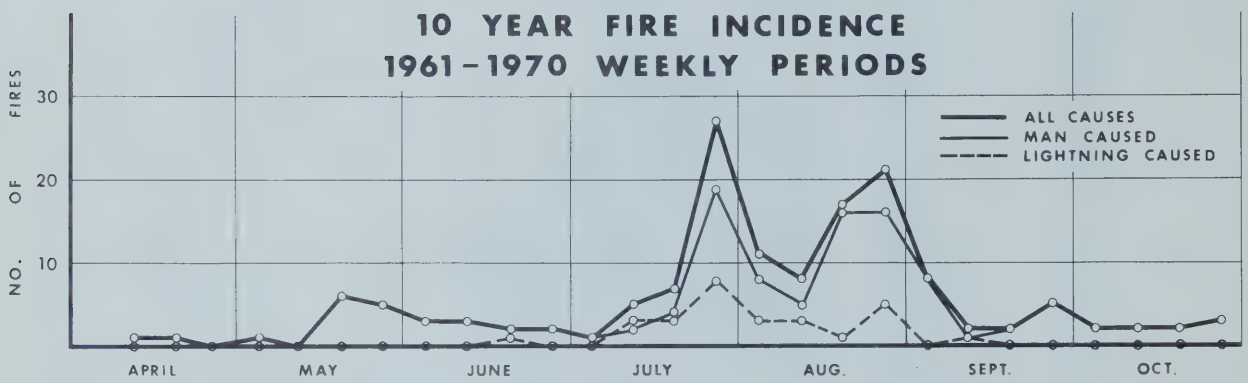


FIGURE 16

EDSON FOREST

10 YEAR FIRE INCIDENCE

1961 - 1970 WEEKLY PERIODS

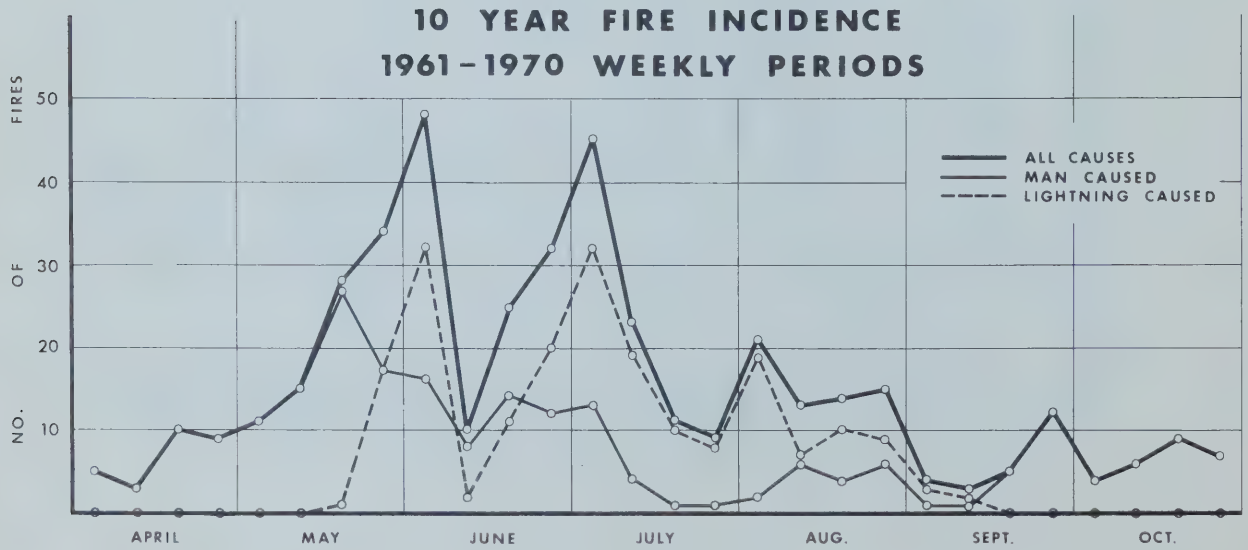


FIGURE 17

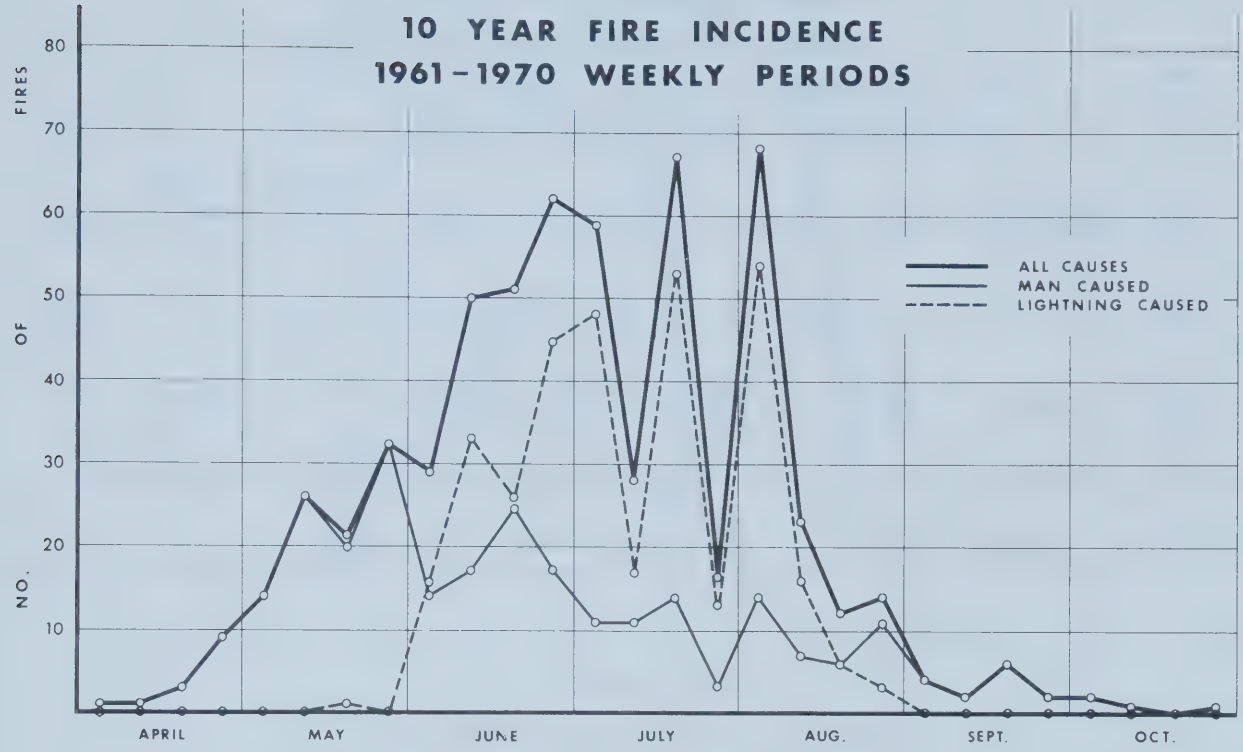


FIGURE 18

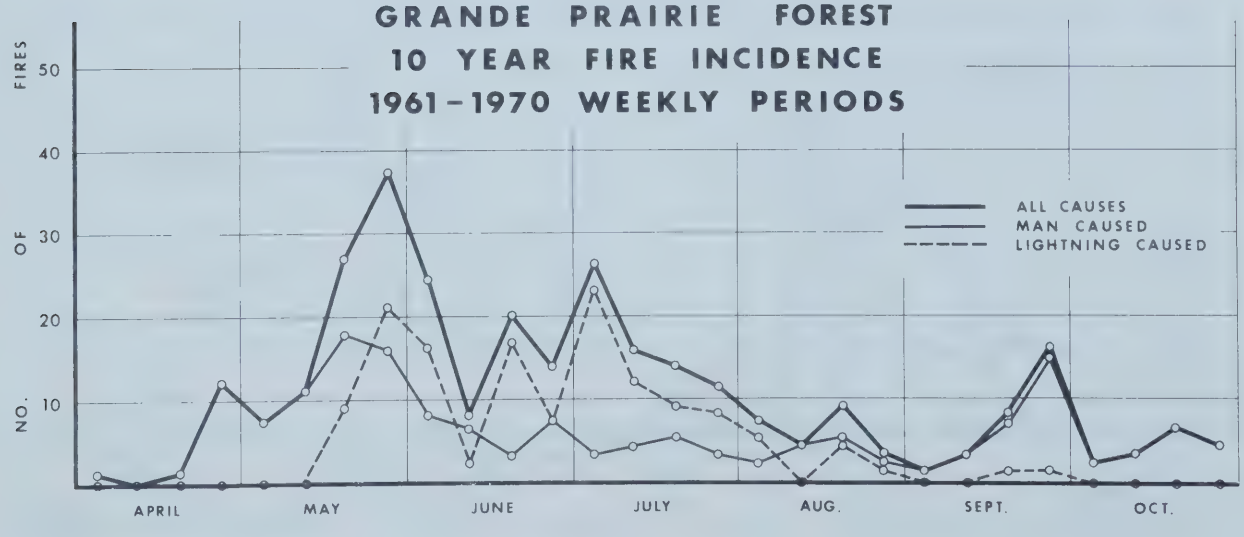


FIGURE 19

ATHABASCA FOREST
10 YEAR FIRE INCIDENCE
1961 - 1970 WEEKLY PERIODS

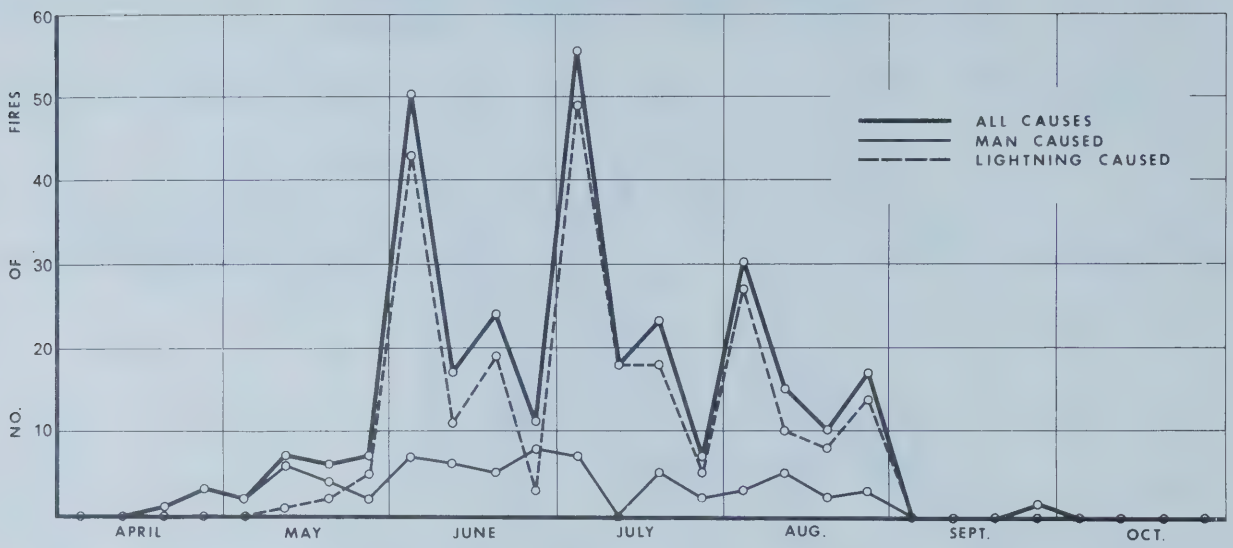


FIGURE 20

LAC LA BICHE FOREST
10 YEAR FIRE INCIDENCE
1961 - 1970 WEEKLY PERIODS

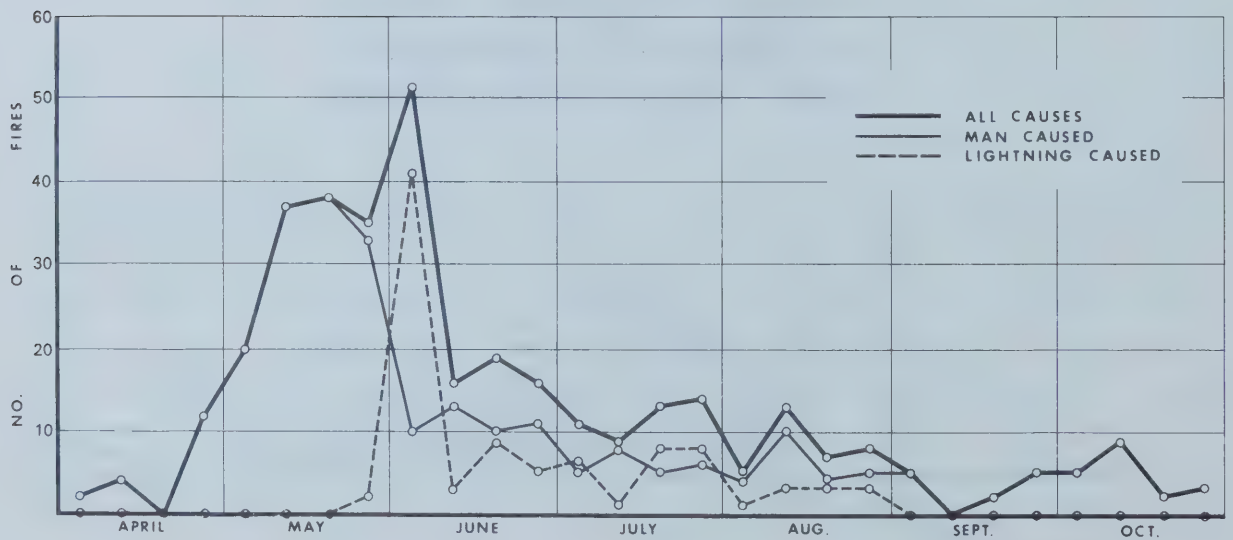


FIGURE 21

PEACE RIVER FOREST
10 YEAR FIRE INCIDENCE
1961 – 1970 WEEKLY PERIODS

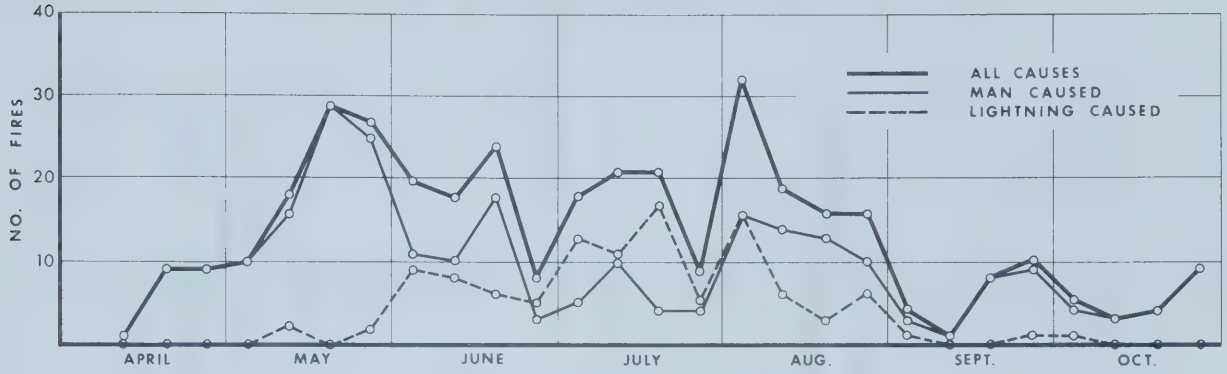


FIGURE 22

ROCKY-CLEARWATER FOREST
10 YEAR FIRE INCIDENCE
1961 – 1970 WEEKLY PERIODS

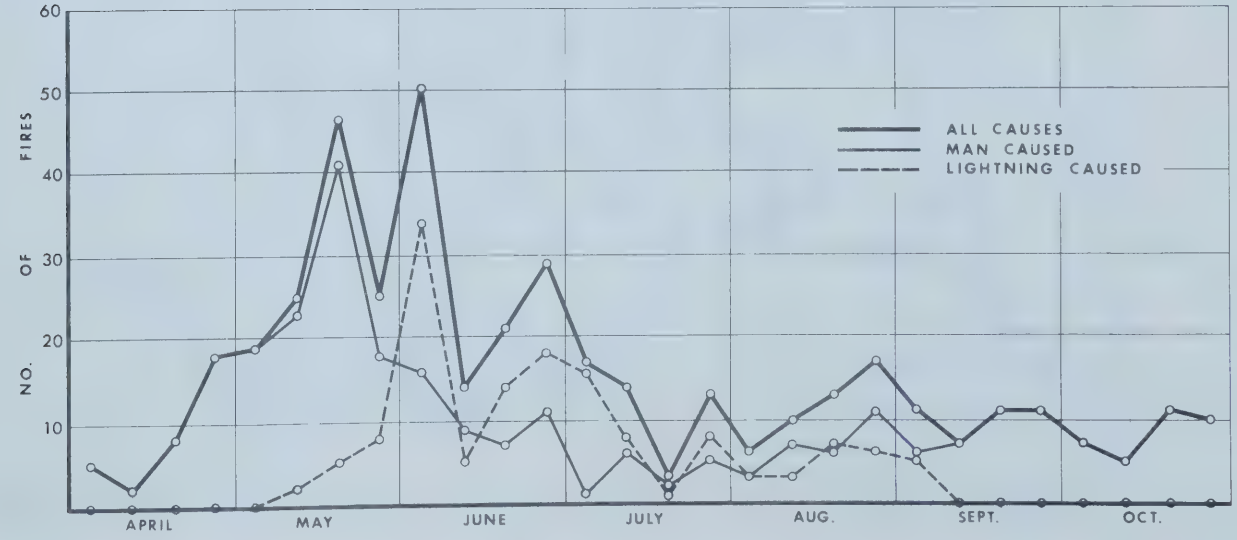


FIGURE 23

SLAVE LAKE FOREST
10 YEAR FIRE INCIDENCE
1961 – 1970 WEEKLY PERIODS

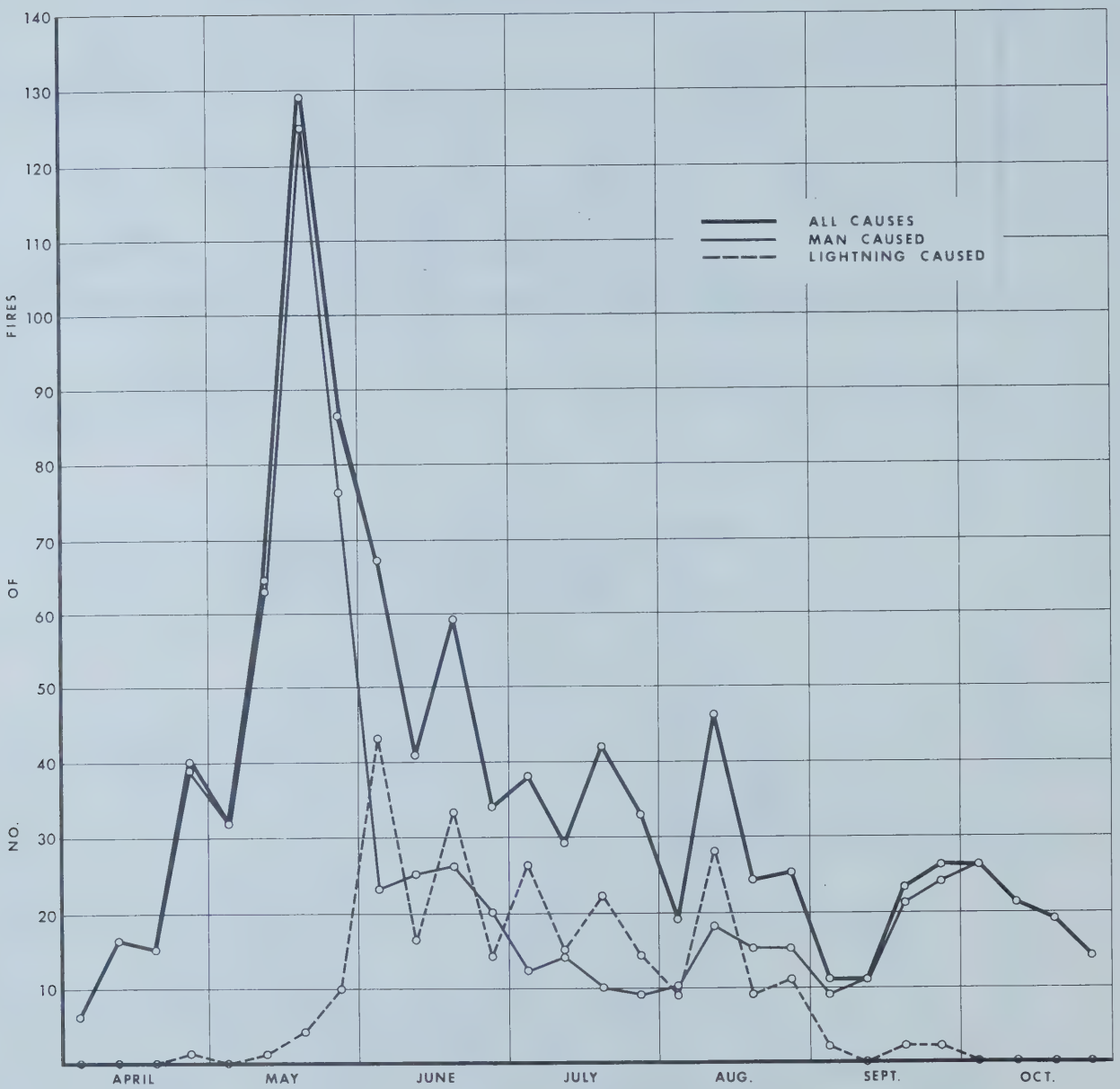
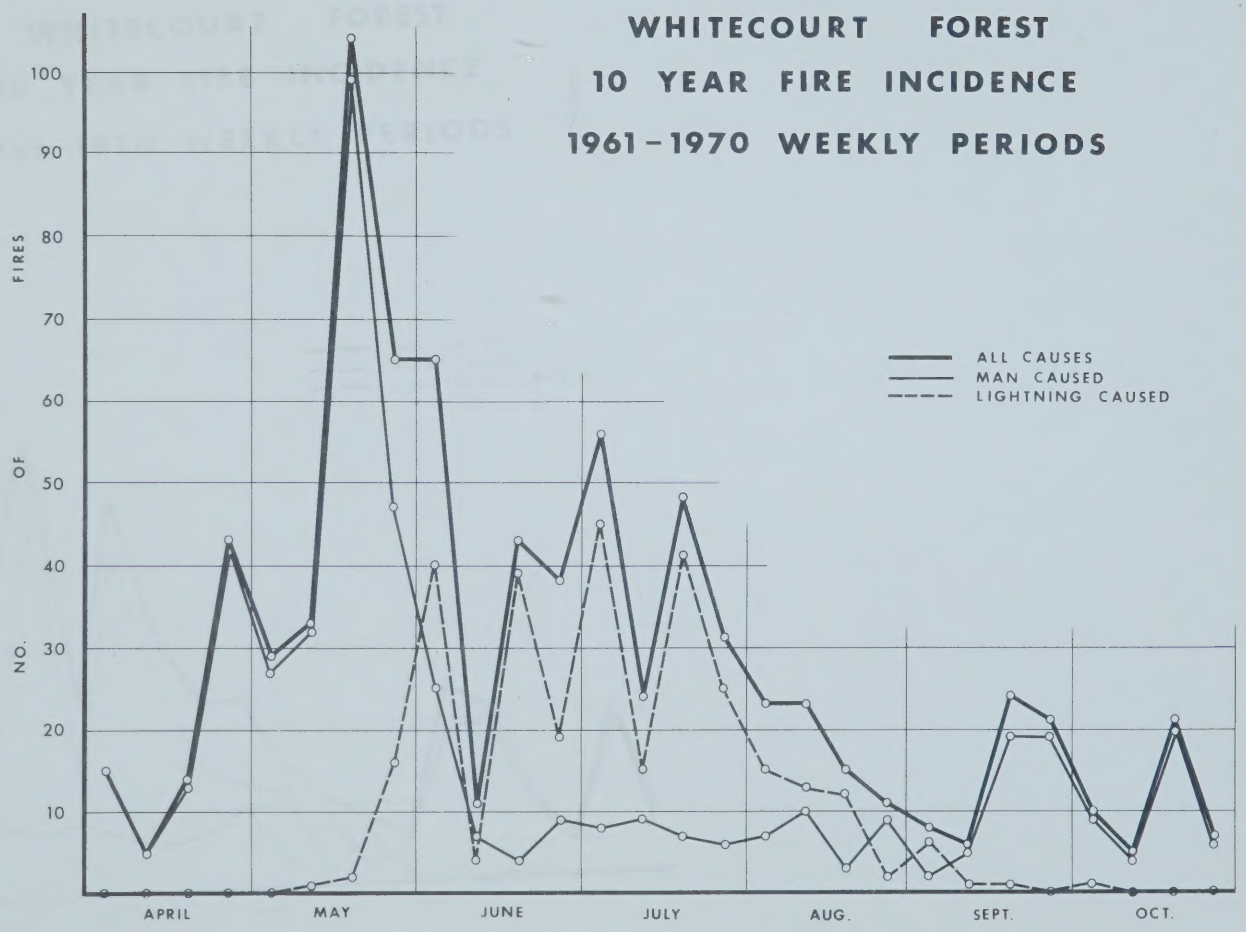


FIGURE 24

WHITECOURT FOREST

10 YEAR FIRE INCIDENCE

1961 – 1970 WEEKLY PERIODS



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